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2. PROBLEM STATEMENT

This Problem Statement includes a description of: (a) violated Water Quality Objectives that prompted TMDL development, (b) watershed characteristics that contribute to low dissolved oxygen, and (c) impairments caused by low dissolved oxygen.

Recent water quality sampling results from the watershed indicate low dissolved oxygen concentrations, high biological oxygen demand, and chemical oxygen demand concentrations, all water quality indicators for dissolved organic matter. These concentrations violate: (1) narrative and numeric standards in the *Water Quality Control Plan for the Colorado River Basin Region* (Basin Plan) (Colorado River Basin Regional Water Quality Control Board 2003), and (2) narrative standards in Minute No. 264 of the Mexican-American Water Treaty. The violation of these standards indicates the impairment of the New River's designated beneficial uses due to dissolved oxygen concentrations that endanger wildlife and may contribute to public health hazard.

The New River's two major sources of dissolved organic matter are: (1) NPDES facilities that discharge wastes, and (2) the municipality of Mexicali, Mexico, which has an inadequate sewage infrastructure that discharges raw and partially treated sewage.

A. WATER QUALITY OBJECTIVES

Dissolved Oxygen, Biological Oxygen Demand, Chemical Oxygen Demand, and discharges of wastes or wastewater are present in the New River at levels that violate narrative and numeric water quality objectives established by the Regional Board to protect New River beneficial uses. These violations of water quality objectives indicate that New River beneficial uses are impaired. Tables 2.1, 2.2 and 2.3 summarize water quality objectives and New River beneficial uses.

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Table 2.1: Water Quality Objectives - General Surface Water Objectives

Parameter	General Surface Water Objectives
Aesthetic Qualities	<p>All waters shall be free from substances attributable to wastewater of domestic or industrial origin or other discharges which adversely affect beneficial uses not limited to:</p> <ul style="list-style-type: none"> ❖ Settling to form objectionable deposits; ❖ Floating as debris, scum, grease, oil, wax, or other matter that may cause nuisances: and ❖ Producing objectionable color, odor, taste, or turbidity.
Dissolved Oxygen	<p>The dissolved oxygen concentration shall not be reduced below the following minimum levels at any time:</p> <p>WARM.....5.0 mg/L</p>
Suspended Solids	<p>Discharges of wastes or wastewater shall not contain suspended or settleable solids in concentrations which increase the turbidity of receiving waters, unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in turbidity does not adversely affect beneficial uses.</p>
Turbidity	<p>Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.</p>

Source: California Regional Water Quality Control Board 2003

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Table 2.2: Water Quality Objectives - Specific Surface Water Objectives for New River

Specific Surface Water Objectives for New River			
Minute No. 264 of the Mexican-American Water Treaty titled “Recommendations for Solution of the New River Border Sanitation Problem at Calexico, California - Mexicali, Baja California Norte” was approved by the Governments of the United States and Mexico effective on December 4, 1980. Minute No. 264 specifies qualitative and quantitative standards for the New River at the International Boundary. Therefore, as indicated by the Basin Plan, the Regional Board views the Minute No. 264 standards as interim standards and intends to pursue long-range quantitative standards for the New River at the International Boundary beyond those contained in Minute No. 264.			
	Numeric Specific Surface Water Objectives		
Parameter	New River at Boundary ¹	Lagoon Discharge Canal	New River Upstream of Discharge Canal
BOD		30 mg/L filtered (monthly grab sample)	30 mg/L unfiltered (monthly 12-hr. composite sample) ²
COD		70 mg/L filtered	100 mg/L unfiltered (monthly 12-hr. composite sample) ²
DO	5.0 mg/L (daily grab sample)		
Parameter	Narrative Specific Surface Water Objectives		
Untreated Domestic and Industrial Wastes	The waters of the River shall be free of untreated domestic and industrial waste waters.		
Toxic Substances	The waters of the River shall be free from substances that may be discharged into the River as a result of human activities in concentrations which are toxic or harmful to human, animal or aquatic life or which may significantly impair the beneficial uses of such waters.		
1. For necessary and adequate monitoring, samples should be taken of the new River waters at the international Boundary monthly or more frequently if necessary, and these should be analyzed for BOD, COD, and DO. Samples should also be analyzed for toxic substances as considered necessary.			
2. Twelve consecutive hourly samples once a month (24-hour composite to be taken as needed to establish correlation with 12-hour composite.			

Source: California Regional Water Quality Control Board 2003

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Table 2.3: Designated Beneficial Uses of the New River

Designated Beneficial Uses	Description
Warm Freshwater Habitat (WARM)	Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Wildlife Habitat (WILD)	Uses of water that support terrestrial ecosystems including, but not limited to, the preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), water, and food sources.
Preservation of Rare, Threatened, or Endangered Species (RARE) ¹	Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.
Contact Recreation (REC I) ²	Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, and use of natural hot springs.
Non-Contact Recreation (REC II)	Uses of water for recreational activities involving proximity to water, but not normally involving contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment of the above activities.
Freshwater Replenishment (FRSH)	Uses of water for natural or artificial maintenance of surface water quality or quantity.
<p>1. Rare, endangered, or threatened wildlife exists in or utilizes some of these waterway(s). If the RARE beneficial use may be affected by a water quality control decision, responsibility for substantiation of the existence of rare, endangered, or threatened species on a case-by-case basis is upon the California Department of Fish and Game on its own initiative and/or at the request of the Regional board; and such substantiation must be provided within a reasonable time frame as approved by the Regional Board.</p> <p>2. Although some fishing occurs in the downstream reaches, the presently contaminated water in the river makes it unfit for any recreational use. An advisory has been issued by the Imperial County Health Department warning against the consumption of any fish caught from the river and the river has been posted with advisories against any body contact with the water.</p>	

Source: California Regional Water Quality Control Board 2003

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B. WATERSHED CHARACTERISTICS

NEW RIVER WATERSHED

The New River watershed drains approximately 200,000 acres from the Imperial Valley, the Mexicali Metropolitan area, and approximately 300,000 acres in the Mexicali Valley, Mexico. Within the United States, the New River channel is approximately 60 miles long and up to 2/3 mile wide. Within Mexicali, Mexico, this natural channel way extends about 12-16 miles. The River carries agricultural runoff, partially treated and untreated Municipal and Industrial wastewater, stormwater, and urban runoff from the Mexicali Valley northward across the International Boundary into the United States.

The New River's flow at the International Boundary averaged 182,000 acre-feet/year (AFY) from 1980 to 1997 (Tetra Tech 1999). Once it crosses the International Boundary, the River travels approximately 60 miles through the Imperial Valley where it is fed by: (a) agricultural return water discharged to agricultural drains owned and operated by the Imperial Irrigation District (accounting for about 2/3 of the River's flow), (b) treated Municipal and Industrial wastewater, and (c) stormwater and urban runoff (Table 2.4). The flow of the New River is about 600 cfs (or roughly 434,400 AFY) at its outlet with the Salton Sea. Table 2.4, below, shows the estimated flow composition of the New River.

Table 2.4 New River Flow Sources

Source	Flow Contribution (% of 438,400 AFY)
American Sources	
Agricultural runoff	62%
Treated Municipal and Industrial wastewater	2%
Stormwater and urban runoff	<0.5%
Mexican Sources	
Agricultural runoff	25%
Partially treated and untreated Municipal and Industrial wastewater	8%
Stormwater, urban runoff, other	2.5%

CURRENT TMDLS

The New River Pathogen TMDL and the New River Silt/Sedimentation TMDL have been adopted by the Regional Board and approved by the SWRCB, OAL, and USEPA. Both TMDLs are currently being implemented and may have a positive impact on the New River dissolved oxygen.

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SOIL CLASSIFICATIONS

Local soils are mostly colloidal clays and silts. These soils tend to be cohesive, and therefore not easily erodible. This is evident in that the channel of the New River and its tributary drains remain relatively stable. In-stream erosion and wind deposition are believed to be a relatively minor source of suspended sediment. All Imperial Valley soils are poorly drained due to low permeability's (less than 0.5 inches per hour). Soil descriptions (Zimmerman 1981) are in Appendix X.

WEATHER

The climate of the Imperial Valley is hot, with dry summers, occasional thunderstorms, and gusty high winds with sandstorms. The area is one of the most arid in the United States, with an average annual rainfall of less than 3 inches, and temperatures in excess of 100°F for more than 100 days per year. The average January temperature is 54°F, and the average July temperature is 92°F. Evapotranspiration rates for the Imperial Valley can exceed 7 feet per year, and in hot summer months, can be one-third inch per day (Setmire et al. 1990).

HISTORY OF NEW RIVER POLLUTION

The history of New River pollution is associated with Mexicali population growth and the inception of irrigated agriculture in the Imperial and Mexicali Valleys (Gruenberg 1998). In 1920, the total population of Mexicali was only 6,200. By 1955, about 25,000 people lived in Mexicali, and their raw sewage was being discharged into the New River. Early complaints regarding New River pollution were primarily based on odor. In the early 1950s, the River stench near the boundary was often overpowering, particularly at night. In 1956, the New River's flow at the boundary increased considerably due to development of agricultural drainage return flows from Mexicali Valley. This diluted the water, and temporarily alleviated the odor. However, the problem became increasingly noticeable in the 1960s as sewage loading increased as the population of Mexicali increased. In 1975, the population jumped to over 100,000 people¹. The present population of the Mexicali municipality is reportedly 764,902 (INEGI 2001), but some believe it is close to 1 million.

In 1978, the California State Department of Health Services (DHS) recommended that the New River be posted as a public health hazard, due to the presence of raw sewage. The first of 50 signs along the River was posted. Downstream of the International Boundary, the New River is dominated by agricultural return flows from Imperial Valley. Up until the late 1960s, the New River also conveyed raw sewage from nearby Imperial County cities and communities (e.g., Calexico, Brawley, and Westmorland). Three Imperial County landfills are adjacent to the River and are as problematic as similar dumps in Mexicali.

¹ Due to the recent industrial growth in Mexicali, industry is now believed also to be an increasingly significant source of New River pollution.

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C. IMPAIRMENT BY DISSOLVED OXYGEN

DISSOLVED OXYGEN, BIOLOGICAL OXYGEN DEMAND, AND CHEMICAL OXYGEN DEMAND CONCENTRATIONS IN THE NEW RIVER, AT THE INTERNATIONAL BOUNDARY, IN VIOLATION OF MINUTE NO. 264 STANDARDS

The New River carries a high dissolved organic matter concentration, as indicated by dissolved oxygen (DO), biochemical oxygen demand (BOD), and chemical oxygen demand (COD) measurements at the International Boundary, Calexico, CA (Table 2.4).

Table 2.5: DO, BOD and COD Data of the New River at the International Boundary, Calexico, CA

Data Source	Period of Record	Record Type	DO (mg/L)	BOD (mg/L)	COD (mg/L)
Regional Board	1/98 - 12/02	mean			
	(monthly)	maximum			
		minimum			

Source: California Regional Water Quality Control Board 2003

The Mexicali metropolitan area is serviced by two wastewater treatment lagoon systems that have a total combined rated design capacity of about 20 to 25 million gallons per day (mgd). The systems are organically and hydraulically overloaded because local municipal sewage flows at 35 to 40 mgd. Because of the lack of treatment capacity and an inadequate, dilapidated collection system, Mexicali discharges 5 to 20 mgd of untreated municipal wastewater into the New River or its tributaries. This constitutes a violation of the narrative standards of Minute No. 264.

Additionally, numerous point and nonpoint sources of pollution discharge untreated wastes into the River and its tributaries². These untreated wastes and raw sewage bypasses have been reported by: (1) the American and Mexican sections of the International Boundary and Water Commission (IBWC), and (2) Regional Board and IBWC personnel during binational monthly inspections and observations of the New River watershed in Mexicali. Untreated discharges, improperly treated discharges, and bypasses are in violation of Minute No. 264. Table XX, in Appendix X, shows dissolved oxygen results for the New River at the International Boundary, from 1998 through 2002.

² A more detailed analysis of point and nonpoint sources of pollution within the Mexicali metropolitan area is presented in the Source Analysis section of this TMDL.

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HABITAT AND WILDLIFE

The New River is a part of the Salton Sea Transboundary Watershed and is therefore an important component of the Pacific Flyway, a major migratory route connecting Canada and the U.S. to Mexico and Central America. The degradation of wetland habitat elsewhere along the Pacific Flyway has rendered the area vital habitat for migratory avian species (USFWS 1997). Millions of birds representing hundreds of species, including several endangered species, use the watershed as year-round habitat.

The severe pollution of the New River has prevented the establishment of a healthy ecosystem, especially within the first 10 to 20 river miles in the U.S. Lethal dissolved oxygen concentrations, harmful pathogens, excessive sediments and nutrients, and pesticides all combine to form an extremely hazardous environment for wildlife. The diversity and abundance of life in the New River ecosystem is directly related to the River's dissolved oxygen trends (Setmire 1985).

By the time the river reaches the United States, the New River is often dominated by raw sewage and untreated industrial wastes from Mexicali. This causes the River's dissolved oxygen to become depleted (i.e., to be typically less than 1 mg/L) for up to 20 river miles downstream of the border. In the first 20 miles north of the border, dissolved oxygen concentrations are depleted to the point where they are often less than 0.5 mg/L. Fish diversity and populations are generally low here, with no more than 3 species collected and sometimes only a single individual collected (Setmire 1985).

As the New River courses through the Imperial Valley, a number of processes work to replenish the River with oxygen and thus greatly improve the opportunity for life: (1) bacteria breaks down organic waste by decreasing the organic load; (2) the River flows over drop structures which re-aerate the water through agitation; and (3) agricultural return flows input water that has a relatively high dissolved oxygen content. Dissolved oxygen levels return to around 4 mg/L, about 10 miles from the River's outlet to the Salton Sea.

The New River's riparian corridors and deltas are potential major wildlife movement corridors and constitute sensitive habitat. The dominant plant species in these corridors is salt cedar, an introduced species that has suffocates native vegetation. Other plant species include reeds, cattails, and arrowheads (Montgomery 1987). Stream biota must withstand extremes in water quality arising from wild fluctuations in dissolved oxygen, as well as variation in temperature. These stresses result in severely decreased biological diversity in the New River. However, large numbers of birds flock to the area because of the abundance of water in the middle of a desert. The diversity and abundance of bird species increases as dissolved oxygen increases, as the New River flows closer to the Salton Sea.

Birds are the most diverse wildlife group using the New River watershed. Over 50 bird species are represented. The most common birds are the burrowing owl (state and federal species of concern), savannah sparrow, yellow-rumped warbler, and red-winged

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blackbird. The New River watershed is also potential habitat for the Yuma clapper rail (state-fully-protected-threatened and federally endangered) (USFWS 1997) and California Black rail (state-fully-protected-threatened). Other songbirds and shorebirds that inhabit the area include the western yellow-billed cuckoo, great blue heron, black-necked stilt, American avocet, cattle egret, white-faced ibis, and double-crested cormorant.

Fish in the New River watershed include mosquitofish, carp, yellow bullhead channel and flathead catfish, tilapia, longjaw mudsucker, largemouth bass, red shiner, and sailfin mollie. The desert pupfish (state and federally endangered) is found in IID Ag Drains and the New River near the outlet to the Salton Sea (USFWS 1997). Fish species inhabiting the New River are relatively well-adapted to extreme conditions in water quality, but are still vulnerable to lethal dissolved oxygen concentrations in the upper reaches.

RECREATIONAL ACTIVITIES

Decomposing sewage and foul odor impede and or inhibit recreational activities on the banks of the river and or at the river. Untreated industrial and urban dissolved organic matter may be a threat to public health.

SUMMARY OF EXISTING CONDITIONS

Dissolved oxygen concentrations in the New River indicate polluted conditions that impair recreational activities and threaten aquatic wildlife and habitat, particularly near the International Boundary. The main sources of these pollutants are discharges of wastes from wastewater treatment plants in the Imperial Valley and untreated and partially treated wastes from the Mexicali area.